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SWIFT FOX INVENTORY ON THE BUFFALO GAP NATIONAL GRASSLANDS

by
Jon Sharps

FINAL REPORT

TO

ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

RAPID CITY, SD

CONTRACT #(43-82FT-9-0920)

SWIFT FOX INVENTORY ON THE BUFFALO GAP NATIONAL GRASSLANDS MAY 16 - AUGUST 25, 1989

by Jon Sharps

Introduction

Prior to human settlement, swift fox were reported to be relatively abundant throughout the Great Plains (Hall and Kelson 1959). The journals of early fur traders and trappers noted them as they traveled throughout the Dakotas and Montana (Reid and Gannon 1928; Bailey 1926; Johnson 1969).

The small size of the swift fox, roughly that of a house cat, and the characteristics and coloration of their fur make them uneconomical to trappers. However, swift foxes natural curiosity and propensity for "investigating" traps set for coyotes and red fox leave them extremely vulnerable to this method of predator control (Sharps 1977; Hillman and Sharps 1978; Robinson 1953).

The swift fox is not known to prey upon livestock. In South Dakota, it derives most of its diet from species associated with or found in close proximity of black tailed prairie dog (Cynomys ludovicianus) colonies (Hillman and Sharps 1978; Uresk and Sharps 1986). Techniques and requirements needed to manage swift fox populations for this area have been studied and are mostly known (Sharps 1985; Sharps and Uresk 1980). There are still a few areas of swift fox biology, however, that need further investigation.

Purpose

The purpose of this investigation is to provide information as to location of swift fox natal dens for further analysis and management considerations.

Objectives

To record population status of swift fox on the Buffalo Gap National Grasslands by:

1. Diurnal searches for natal den complexes and,
2. Nocturnal spotlight surveys for swift fox around prairie dog colonies and adjacent grasslands.

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EXPERIMENT STATION

Study Areas and Methods

The area selected for investigation is the east half of the Buffalo Gap National Grasslands of Nebraska National Forest (Fig. 1). Topography is typified by broad to narrow floodplain, to gently rolling upland, to fairly steep slopes and small plateaus surrounded by moderate to deep ravines bisected by the Cheyenne River.

Primary vegetation consists of mid to shortgrass prairie, interspersed with cactus (Opuntia spp.), and cottonwood (Populus deltoides), Green ash (Fraxinus pennsylvanica), chokecherry (Prunus virginiana), with occasional buffaloberry (Shepherdia argentea) in the woody draws and riparian areas. Soil type ranges from clay, to sandy-clay-loam, to rocky-clay. Annual precipitation ranges from 15 to 18 inches.

Swift fox diurnal location methods consisted of utilizing a 4-wheel drive pickup to check known and suspected natal den sites; to check for tracks and signs around stock dams and riparian areas and to follow up in those same areas by a nighttime spotlight survey. Nocturnal swift fox survey methods consisted of looking for foxes in areas selected by diurnal searches with 4-wheel drive pickup and 400,000 candle power spotlight. All swift fox and dens were located on Forest Service maps & forms designed for this purpose. Study duration was from mid May through August 1989. A total of 102 days (625 hours) were spent conducting this survey.

Findings

The area of concentration for the swift fox inventory was initiated at highway 40 and continued south to highway 18, townships 1 south through the north 1/2 of township 10 south and ranges 8 east through 11 east. The south 1/2 of township 10 through 12 south, ranges 8 east through 9 east were not adequately looked at because of time constraints. Townships 7 south through 12 south, ranges 1 east through 7 east were not looked at during the course of the survey. Both of these areas have been reported to have swift fox but due to time constraints, survey efforts were concentrated in the above mentioned areas only.

Townships 1 south through the north 1/2 of township 3 south, ranges 10 east through 12 east did not contain any visual sign of swift fox, and as a result no spotlight surveys were conducted in this area. Both diurnal and nocturnal surveys were concentrated in areas of known past swift fox habitation (fig. 2). Records obtained from South Dakota Department of Game, Fish and Parks and the US Forest Service at Hot Springs, South Dakota indicated 20 sitings of swift fox in this area dating from 1978 to 1988. This same area has had extensive control of black-tailed prairie dogs (Cynomys ludovicianus) with 92 percent of the colonies eliminated. The remaining 8 percent are located in areas surrounded by deep draws and/or river breaks and a range in size from approximately 50 to 200 acres (fig. 2).

Swift fox were observed the 10th through the 12th, 17th through the 19th, the 25th and 26th of July, and the 8th, 9th, 11th, and 18th of August. All sitings were in township 8 south, ranges 8 and 9 east, section 25, 26, 35 and 36 (first family group) and township 8 south, ranges 8 and 9 east, sections 8, 17, 19 and 20 (second family group) (fig. 3). Fresh swift fox tracks were observed on May 26th at township 4 south, range 11 east, SW 1/4 SW 1/4 section 30. These tracks were less than 24 hours old. Extensive spotlighting by myself and Mike Whitcher

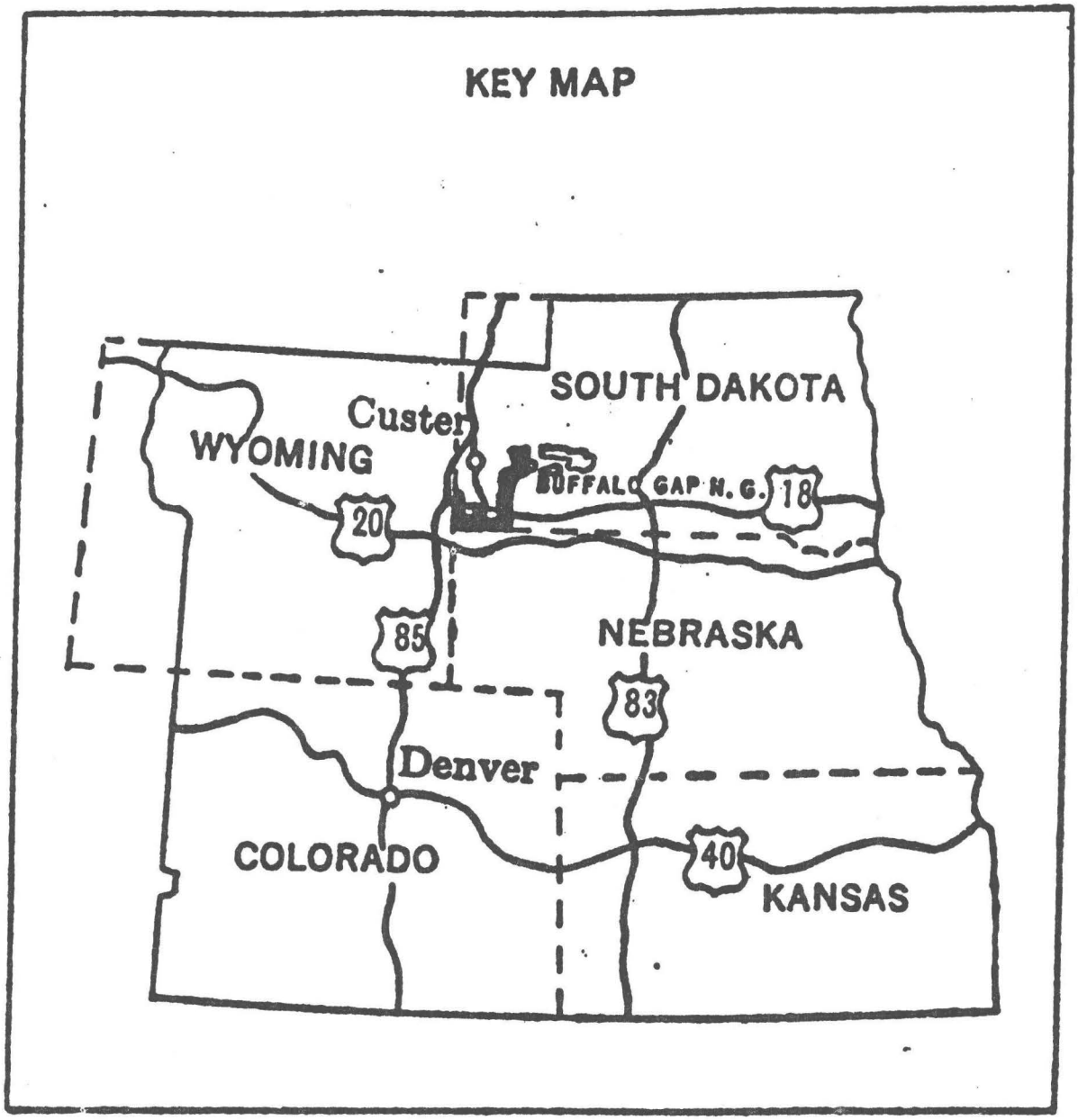

KEY MAP
SOUTH DAKOTA
Custer
WYOMING
BUFFALO GAP N. G.
18
20
85
NEBRASKA
83
Denver
COLORADO
40
KANSAS

Fig. 1

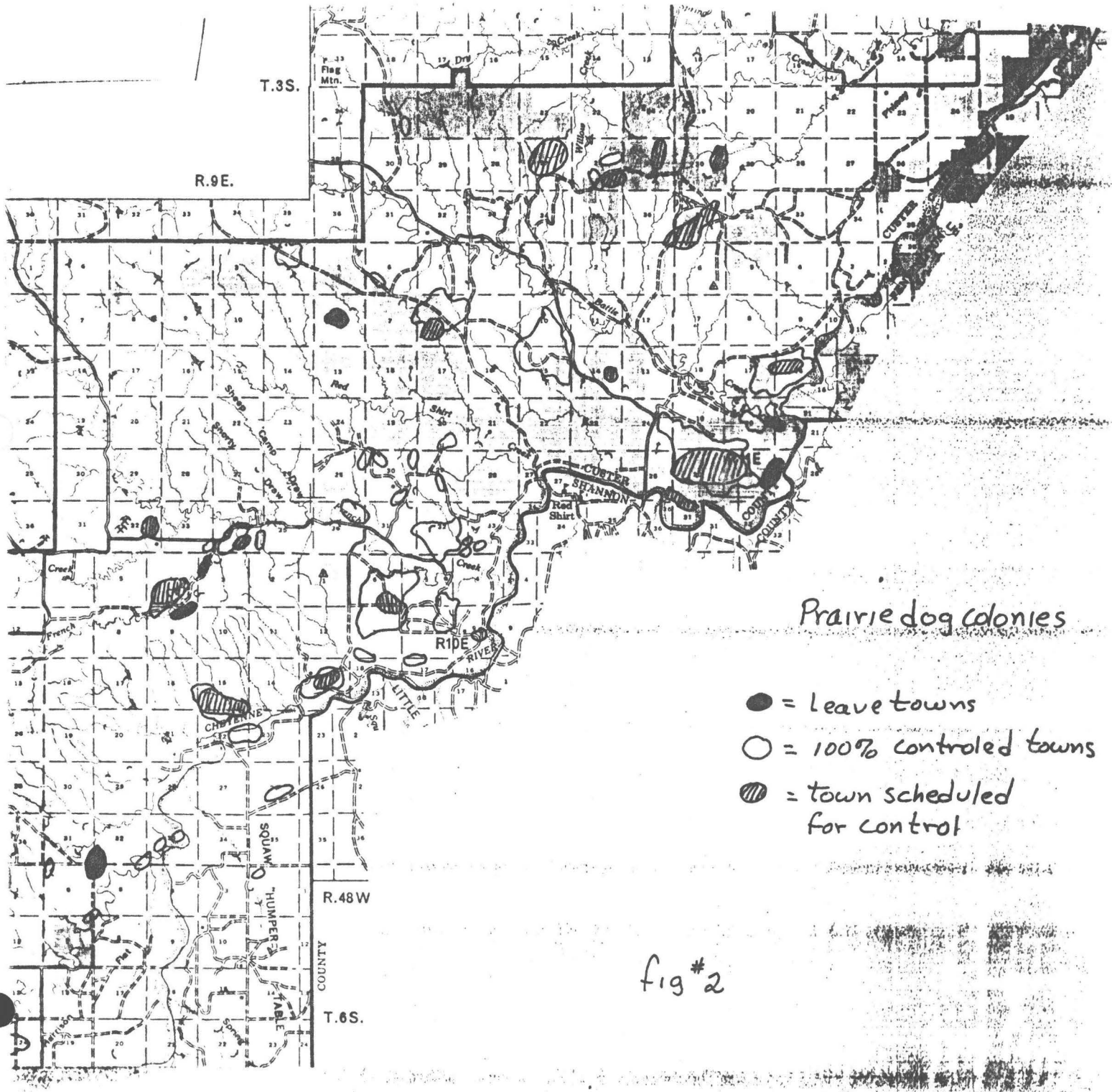

T.3S.
R.9E.
Flag Mtn.
Dry
Creek
Willow
Prairie
Custer
Battle
Red
Shirt
Sheep
Camp
Draw
Creek
French
Creek
SHANNON
Red Shirt
COUNTY
R1DE
RIVER
LITTLE
CHEYENNE
SQUAW
"HUMPER"
TABLE
R.48W
COUNTY
T.6S.
Prairie dog colonies
= leave towns
= 100% controled towns
= town scheduled for control

fig #2

Prairie dog colonies

● = leave towns

○ = 100% controled towns

▨ = town scheduled for control

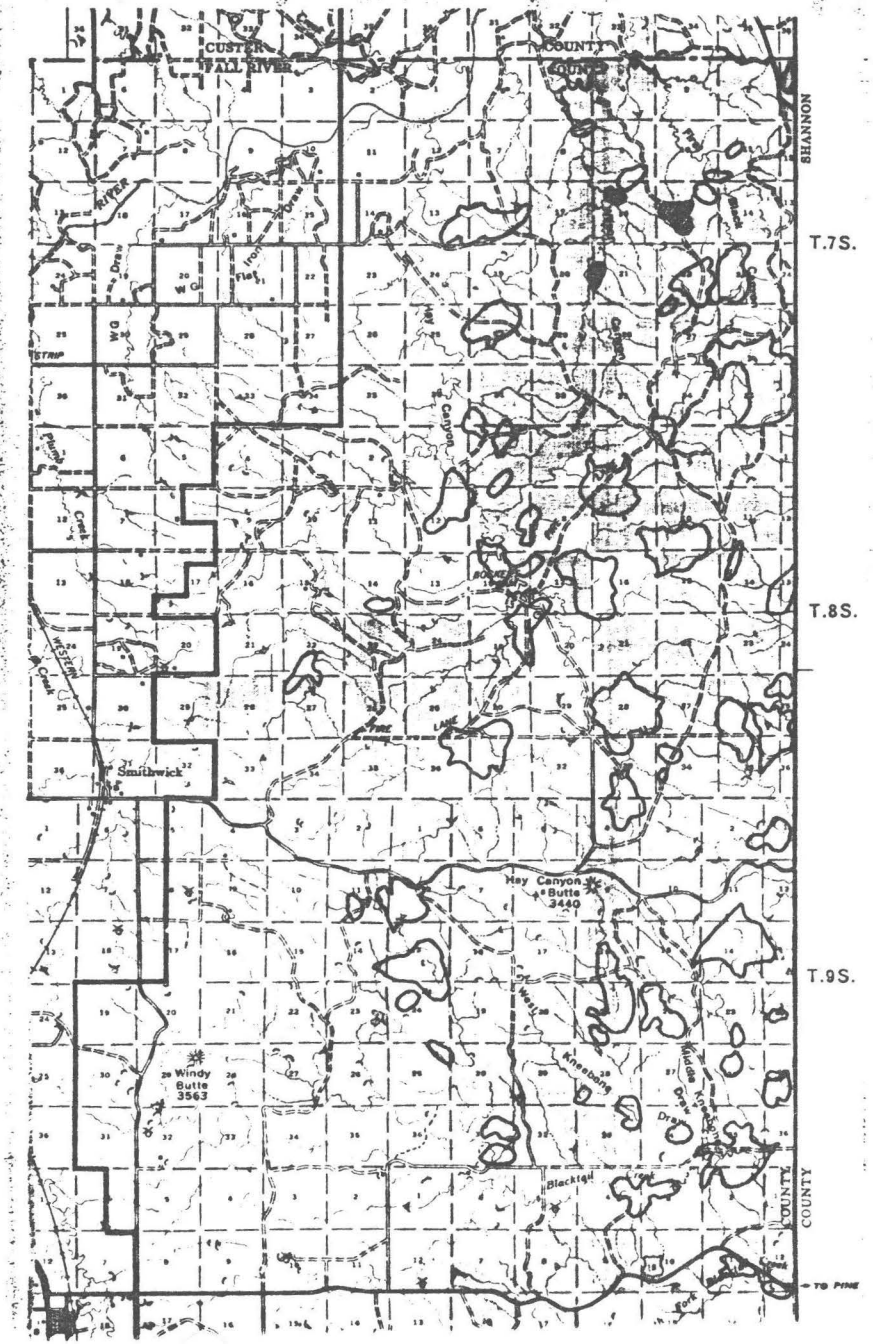


fig #2, con't.

⊛ = swift fox den locations, 1989

(1&2) = Approximate swift fox home range

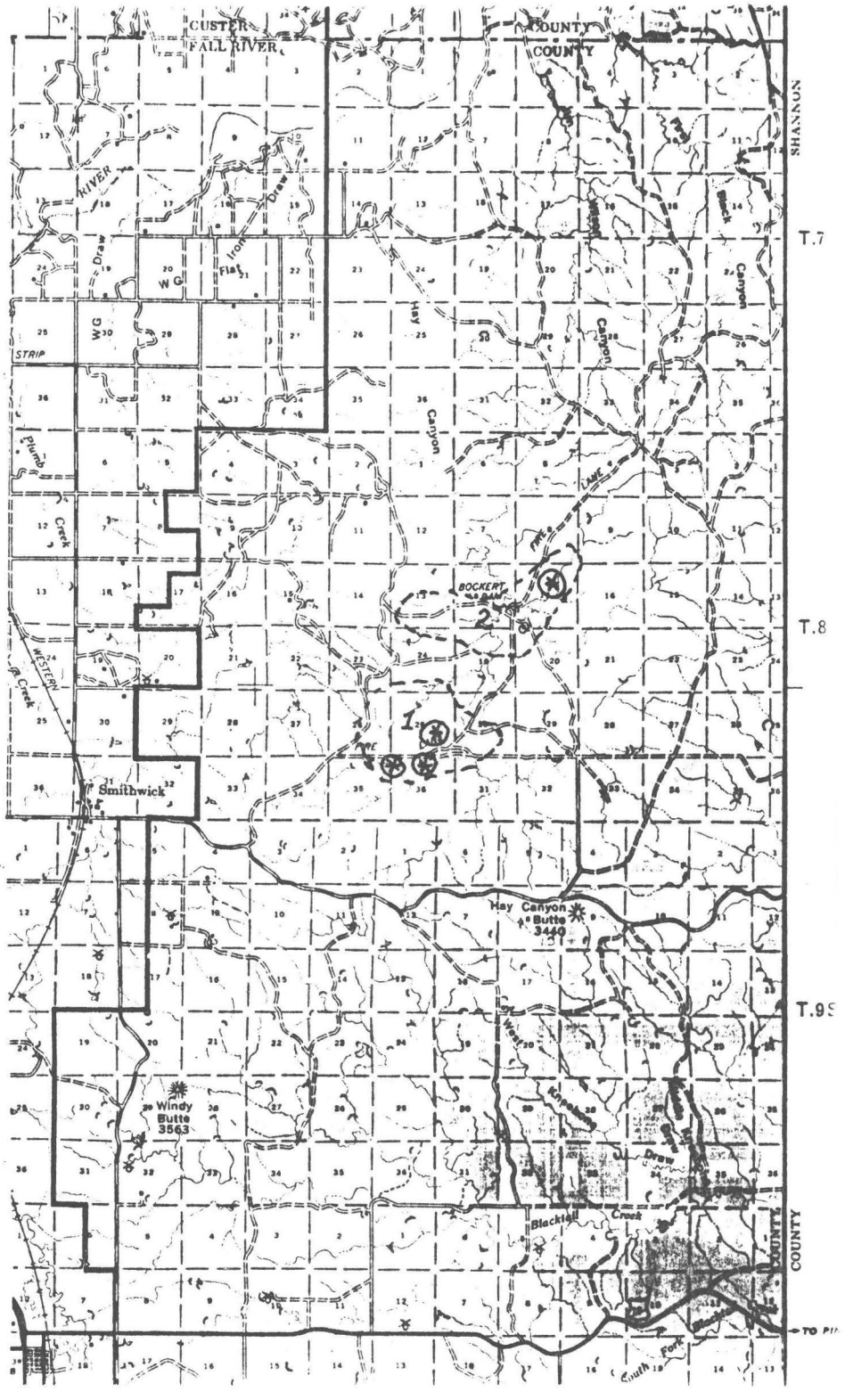


fig # 3

of the South Dakota Department of Game, Fish and Parks found no subsequent visual observations of swift fox in this area.

Numerous swift fox dens were located throughout Forest Service administered lands east of Buffalo Gap, south to the Smithwick-Oglala road (Appendix A through I). Scats and miscellaneous animal remains were collected around active dens and will be saved for future diet analysis.

None of the swift fox visual observations were on live prairie dog towns as would be expected from past studies (Hillman and Sharps 1978, Uresk and Sharps 1986). Both family groups were located on or immediately adjacent to old (100 percent controlled) prairie dog towns. Nocturnal sitings of swift fox were primarily in areas of heavy cactus (Opuntia spp.) growth. Preliminary observations of scat and miscellaneous animal remains indicate utilization of small mammals, insects and ground roosting birds as the primary food base. Further analysis will be needed for an accurate assessment. No information is available of South Dakota swift fox winter food habits. Coyotes (Canis latrans) or their sign were observed at every den site complex. (For the purposes of this report, a den site complex consists of one or more inter-connecting den openings in an immediate area). Coyotes have disturbed swift fox dens by enlarging and utilizing them as their own natal dens or by partially digging them out perhaps in an attempt to catch swift fox or cottontail rabbits (Sylvilagus floridanus) which are abundant in this area. It is not known if coyotes partially dig out dens while the swift fox are using them or at a later date.

All swift fox den complex's showed signs of coyote disturbance with 36 percent of the den openings having some degree of coyote disturbance (Table 1). Predation on swift fox is largely unknown. Coyote predation on swift fox in South Dakota has not been documented. One swift fox pup at den number 09-89, T8S R9E Sec. 17, was apparently eaten by a coyote. This conclusion was drawn from the remains or the lack of remains of the pup, which consisted of well chewed parts of the lower mandibles and a portion of the cranium. No fur or other parts were found. An attack on an adult swift fox by a great horned owl was observed on 7-17-89 by myself and Bob Hodorff of the US Forest Service while spotlighting in the area of the den number 08-89. No other predation attempts were observed, although golden eagles (Aquila chrysaetos), and red-tailed hawks were observed "hanging around" swift fox natal dens while pups played in the late afternoon--early evening hours before going hunting. Indications of moderate to heavy coyote control measures in the area of T75 R9E were recorded. Personal observations include 1 dead coyote killed by shotgun, 1 dead beaver, apparently used as bait for leg-hold trapping, 6 coyote snares, apparently left from last winter, were found and turned over to the local conservation officer plus conversations with the local state trapper in which he admits to extensive aerial hunting of coyotes to "protect" cattle grazing on the Pine Ridge Indian Reservation.

Discussion

There has apparently been wide-scale reductions of swift fox population densities in the area surveyed over the past several years (fig. 4). Several factors are put forth as possibilities for population reductions and it is probably a combination of these factors which caused the decline. Past studies in South Dakota indicate a strong dependence of swift fox on prairie dogs as a primary food base (Hillman & Sharps 1978, Uresk & Sharps 1986). With a 92 percent reduction of prairie dog towns in the inventory area, this food base has been

TABLE 1 *, **

Den #	Total Den Openings	# of Dens in Complex	Complex Dens disturbed by Coyotes: yes or no	# of den openings enlarged by coyotes **
01-89	5	2	yes	1
02-89	3	3	yes	2
03-89	19	3	yes	10
04-89	3	1	yes	2
05-89	2	1	yes	1
06-89	6	2	yes	4
07-89	8	2	yes	1
08-89	39	8	yes	9
09-89	1	1	yes	1
TOTAL	86	23		31

* The totals may be higher because 100 percent of the territory occupied or utilized by swift fox was not covered and as a result all of the dens were not located.

** Some of den openings could have been enlarged by badgers.

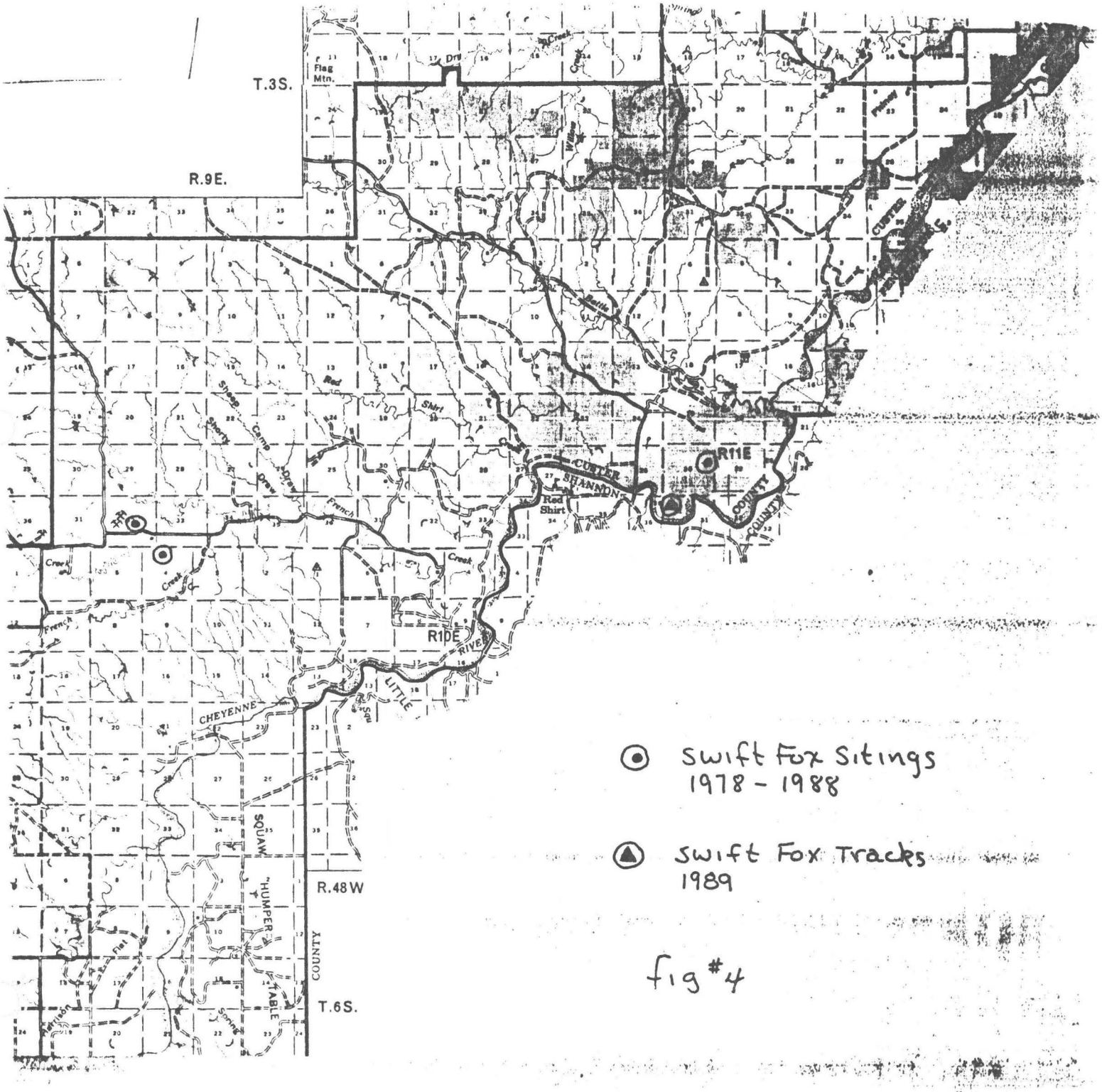
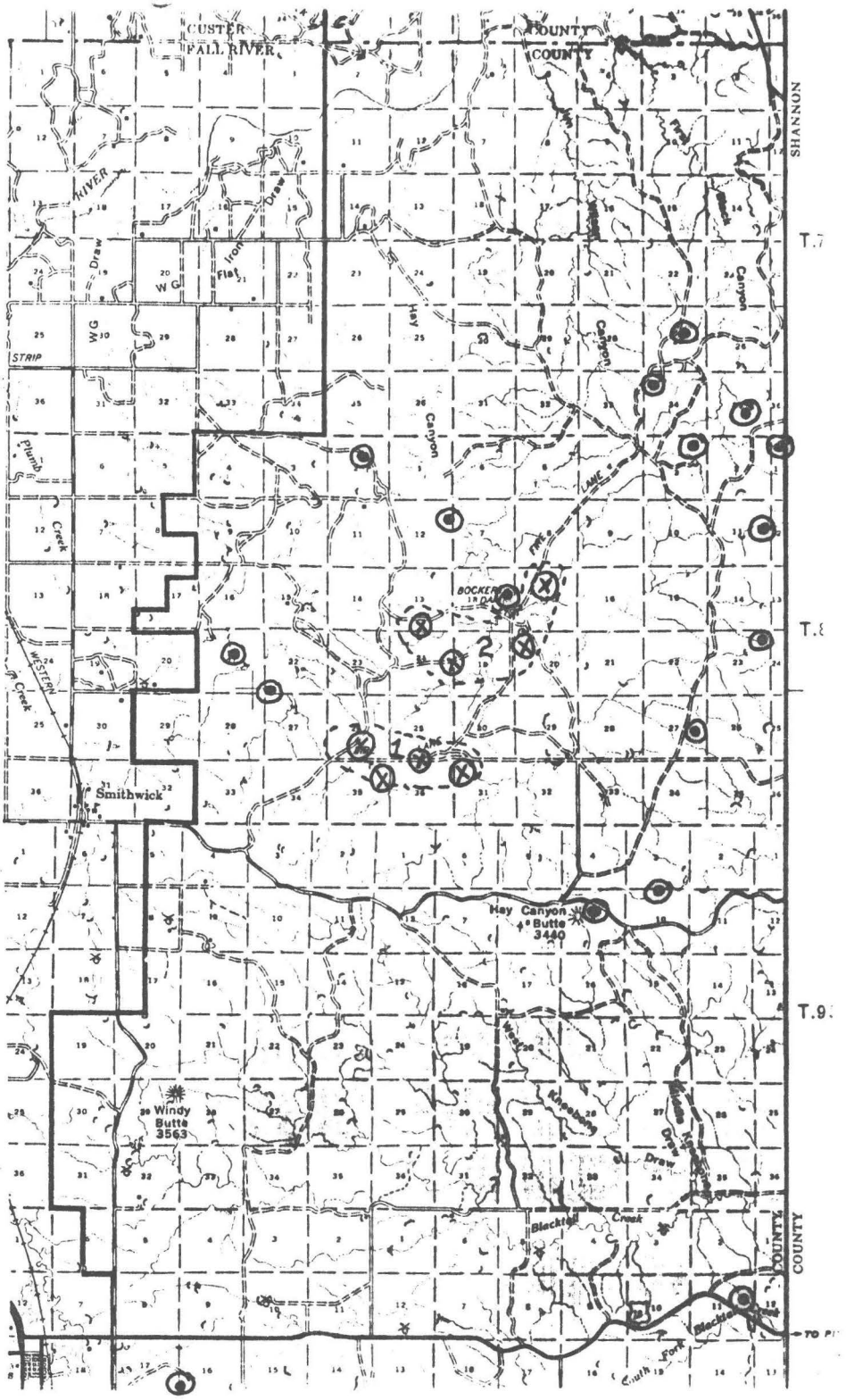

T.3S.
R.9E.
Flag Mtn.
R11E
CUSTER
SHANNON
COUNTY
Red Shirt
R10E
RIVER
LITTLE
CHEYENNE
SQUAW
"HUMPER"
TABLE
R.48W
COUNTY
T.6S.
Swift Fox Sitings
1978 - 1988
Swift Fox Tracks
1989

fig #4

⊙ swift fox sitings 1978 - 1988

⊗ swift fox sitings 1989

Approximate home range



fig# 4, con't.

largely removed. The remaining 8 percent is in habitat which favors coyotes i.e. towns surrounded by deep draws and ravines, and probably because of their size and density may concentrate other predators such as bobcat (Lynx rufus), badger (Taxidea taxus), and eagles (Aquila chrysaetos). In any case, no swift fox were found on active prairie dog towns or within 4 miles of an active prairie dog town during the course of this inventory.

Swift fox are very susceptible to trapping pressure (Johnson 1969). Trapping pressure also causes a disruption in the territory boundaries of the coyote (Allen et al. 1987). Studies of coyote territorial boundaries show them to be slightly larger than one township in size (38 sections) and to be stable over a several year period unless the alpha male or female are killed, then territorial boundaries change and other coyotes come in to compete for the alpha positions (Allen et al. 1987, Sargeant et al. 1987). Swift fox territorial boundaries, during the denning season, are approximately 1 to 2 square miles, expand to 7 to 8 square miles during the winter months and apparently are not restricted to one habitat type but utilize several (Sharps 1985). Studies by Allen et al. 1978, show that coyote territories were larger during spring-summer than they were in the winter, but mentioned that other studies showed opposite results. They state that "significant alteration of territory boundaries can be expected after the death of alpha adults". Sargeant et al. 1987, found that abundance and distribution of coyotes on the Northern Great Plains effected the abundance and distribution of red fox. They also report that "...as coyote den sites increase, the risk of interspecific conflict also likely increases...". Because of the reduction of the food base provided by the prairie dog and associated species, winter may be difficult for the swift fox. Nothing is known in South Dakota of winter swift fox food habits nor their interactions with coyotes or other carnivores. Zumbaugh et al. 1985, found that rabbits and small rodents made up the bulk of winter diet for swift fox in Kansas. Further research into winter food habits, home range and territory of South Dakota swift fox would support improved management of this resource.

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A

SWIFT FOX

Den Site Data

Den No. 01-89

Date 5-26-89

Time 1100

Natal: Yes A No B ? ____

No. of Pups none/old

No. of Openings A=4 B=1

Exposure A=N/A B=SE

Slope flat

Dates in Use:

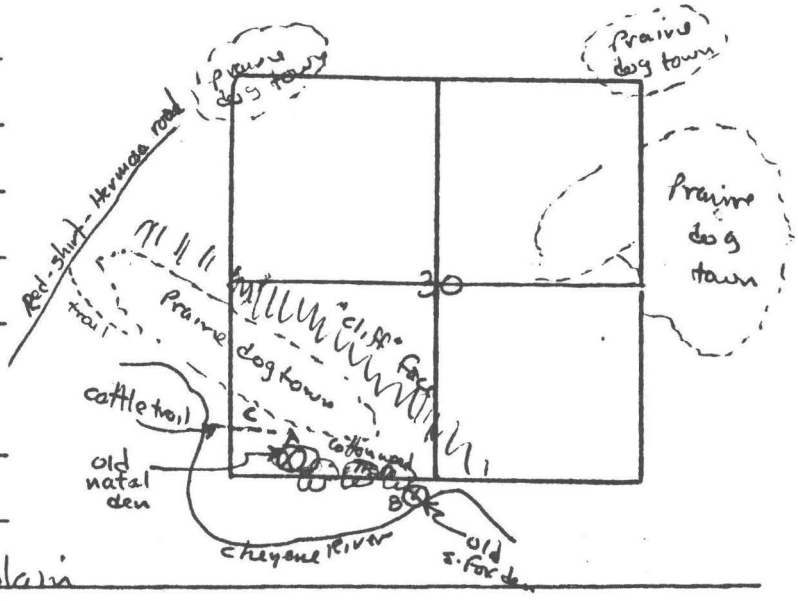
Sign First Seen 5-19-89

Date Abandoned 1988 ±

Location:

County Custer

Twp 4S Rge 11E Sec 30



Topography: cottonwood floodplain

sandy-loam soil

Vegetation: mixed grasses/forbs snowberry, remenant buffalo berry, mature cottonwoods

Activity: abandoned dens, but observed fresh tracks on cattle trail leading to river west of den A.

Food Remains: none

Notes: den A located in oblong mound just East of third cottonwood tree. Probably has been abandoned for at least one year ±. Den B located just in NW ¼ sec 31 or just in SW ¼ sec 30, old den, ± 6 mo.. cattle trail, C, was observed to have fresh swift fox tracks on it, 24 hrs old or less. There are several prairie dog towns North of these old den locations. The grass is fairly tall making it difficult to locate any den complex by daylight. Recommend spotlighting this whole area.

J C Sharps

Observer

SWIFT FOX

Den Site Data

Den No. 02-89

Date 6-5-89

Time 1430

Natal: Yes ✓ No ____ ? ____

No. of Pups none observed

No. of Openings 3

Exposure west

Slope cut bank

Dates in Use:

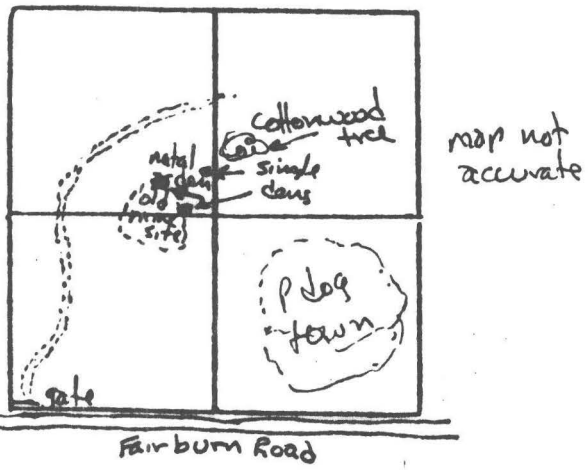
Sign First Seen 6-5-89

Date Abandoned ?

Location:

County Custer

Twp 4S Rge 9E Sec 32



map not accurate

Topography: fairly steep to rolling, rocky to clay soil type

Vegetation: mixed grass, snowberry, single small cottonwood on top near single den

Activity: Cattle are in this pasture & have walked all over excavated soil outside of den area so no sign was observed

Food Remains: meadow lark feather, old scat w/mammal hair

Notes: ~~Could not find the prairie dog town or any old sign of it where it was supposed to be according to USFS maps & data~~. If these fox are still there, they are either feeding on another food source or possibe Prairie dog towns on adjacent private land if those towns exist in the immediate area.

J C Sharp
Observer

C

SWIFT FOX

Den Site Data

Den No. 03-89

Date 6-9-89

Time 1430

Natal: Yes A+B No C ? ____

No. of Pups none observed

No. of Openings A=13 B=5 C=1

Exposure East to south

Slope 10° to 45°

Dates in Use:

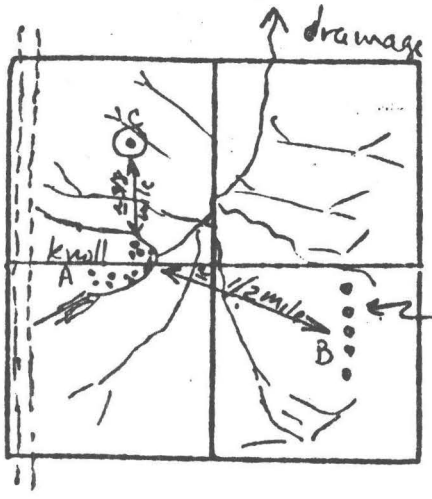
Sign First Seen 6-9-89

Date Abandoned ?

Location:

County Fall River

Twp 7S Rge 9E Sec ~~23~~ ? 22



old S. Fox dens taken over by coyotes. Di... or cattle bones, dog skull & meat... lark feathers at den complex P... numerous coyote scats

Topography: rolling, gently to fairly steep

Vegetation: mixed grass

Activity: none apparent, probably abandoned last year, possibly used as winterden by single adult, badger partially dug out some of the dens

Food Remains: Prairie dog skull & various bones, scat (collected)

Notes: typical swift fox den w/ soil scattered out in an elongated fashion from mouth of den A ≈ 6'. The exact location probably is no... accurate due to large monotypical area features and lack of... landmark locations. Took 2 Pictures of den ⊙c showing coyote inlargement of a Swift fox den. Den B taken over by coyotes.

J C Shaver

OIIER 15

SWIFT FOX

Den Site Data

Den No. 04-89

Location:

Date 6-16-89

County Fall River

Time 1100

Twp 7S Rge 9E Sec 21

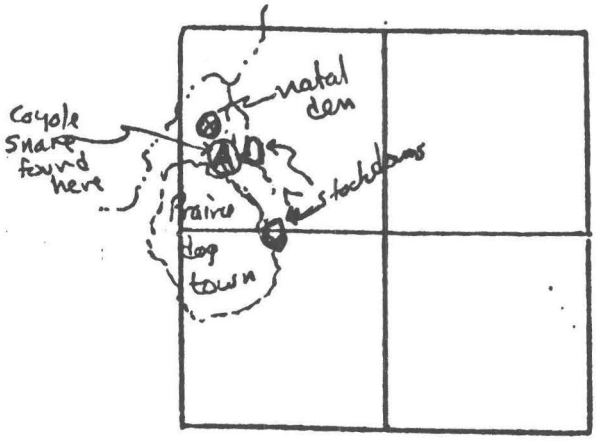
Natal: Yes X No ____ ? ____

No. of Pups none observed

No. of Openings 3

Exposure East

Slope Flat to 15°



Dates in Use:

Sign First Seen 6-16-89

Date Abandoned 88? early 89?

Topography: Flat to moderatly rolling surrounded by deep ravines

Vegetation: mixed grass, cactus, yucca

Activity: old den, coyote sign observed (tracks, digging) badger sign (digging)

Food Remains: none observed

Notes: This P. dog town is one of the lesser areas & is only ≈ 250 ac in size. Not enough size or dogs to support sustained multi-predator use/feeding on P. dogs & associated fauna. Found a coyote snare @ point A (see map) which appeared to have caught a calf or cow (bent & twisted wire). Ranchers have told me that the state trapper has been trapping this area of the grasslands & has bragged about catching swift fox.

J C Shaw

Observer

:n Site Data

SWIFT FOX

Den Site Data

Den No. 05-89

Date 6-27-89

Time 1930

Natal: Yes ____ No AAA ? ✓

No. of Pups none

No. of Openings 2

Exposure north

Slope ≈20° to flat

Dates in Use:

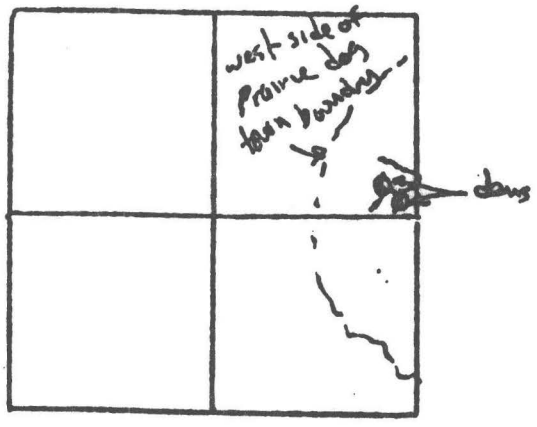
Sign First Seen 6-27-89

Date Abandoned ?

Location:

County Fall River

Twp 7S Rge 9E Sec 15



Topography: moderately rolling leading to steep ravines which surround the area

Vegetation: mixed grass, cactus

Activity: old dens ≈ 1 year ±; on active prairie dog town

Food Remains: none

Notes: one den on flat top of the other den on north facing bank. The top den has been partially dug out by coyotes cottontail use of P. dog town/burrows

J C Sharps
Observer

F

SWIFT FOX

Den Site Data

Den No. 06-89

Date 6-28-89

Time 1030

Natal: Yes ✓ No ____ ? ____

No. of Pups none observed

No. of Openings 4

Exposure west

Slope cut bank

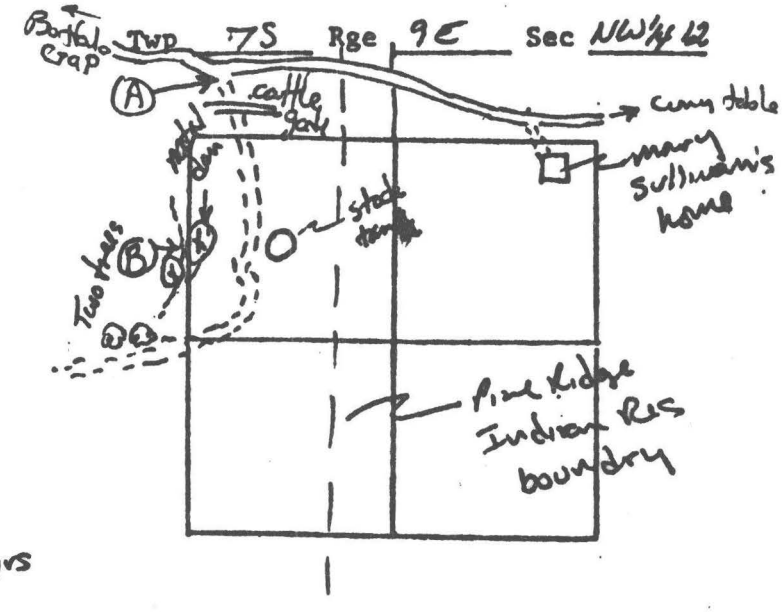
Dates in Use:

Sign First Seen 6-28-89

Date Abandoned ? ≃ 1 to 1.5 yrs

Location:

County Fall River



Topography: rolling hills to steep ravines

Vegetation: mixed grass - snowberry

Activity: cattle grazing - coyote disturbance

Food Remains: one scat + small mammal bones

Notes: This den complex is in a shallow draw with the natal den (4 openings) facing west; about 30 yds south on the east bank are 2 more den openings. Coyotes have been digging out these dens, perhaps after cottontails which could be utilizing the dens in the absence of S. fox. The distance from the road to the densite (Point A to Point B) is 1 mile.

JC Shaw

Observer

Den Site Data

G

SWIFT FOX

Den Site Data

Den No. 07-89

Location:

Date 6-30-89

County Fall River

Time 1330

Twp 7S Rge 9E Sec 22

Natal: Yes ✓ No ____ ? ____

No. of Pups none observed

No. of Openings A=4 ; B=4

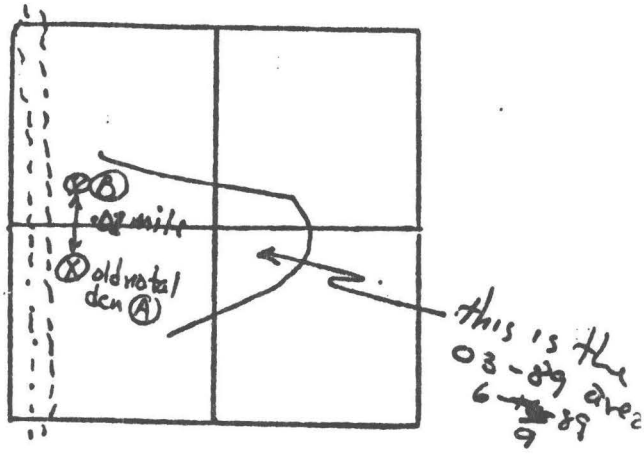
Exposure east

Slope flat to 5°

Dates in Use:

Sign First Seen 6-30-89

Date Abandoned ?



Topography: rolling to steep rolling hills surrounded by deep gullys

Vegetation: mixed grass, cactus, fringed sage

Activity: none except cattle grazing

Food Remains: small mammal bones around den A, nothing found around B.

Notes: (A) This den has not been disturbed by coyotes to date.
(B) has been on one opening, probably after a cottontail as it's been abandoned = 1½ yrs.
I am not sure if the section designation is correct.

K Sharp

Observer

SWIFT FOX

Den Site Data

Den No. 08-89

Date 7-18-89

Time 1845

Location:

County Fall River

Twp 8S Rge 9E Sec 25

Natal: Yes ~~—~~ No ✓ ~~X~~ both types (see note below)

No. of Pups ~~3~~ 4

No. of Openings ~~4 4 3 3 2 2~~ #8 natal den = A=1 B=1

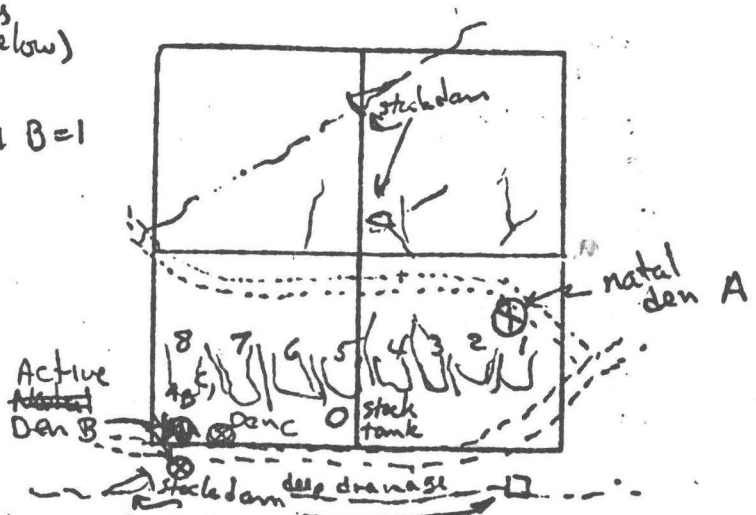
Exposure A=So B=SO C=E natal den Flat

Slope ABC 20%, natal den flat to 5%

Dates in Use:

Sign First Seen 7-18-89

Date Abandoned natal occupied others=1987 ? or 1988 ?



Topography: Flat to gently rolling hills - stock dams in draws, dens on edges of or points of hills (bluff) & scattered thru-out area

Vegetation: mixed grass, cactus

Activity: observed 5 fox in general vicinity 4ea, 7-12 & 7-17, 7-18 6 5. fox seen 7-19-89, 4 pups & 2 adults

Food Remains: none observed for A, B, & C, many scats, feathers & fresh (stomach) remains of small mammals, bones etc. some scats very fresh (todays) some in advanced state of deterioation.

Notes: Many old den complex's along bluffs 1 thru 8: # 1 = 4, # 3 = 6, # 5 = 5, # 6 = 10 & # 8 = 14
Natal den has only one opening but divides in two immediately below surface. Many old & new scats & remains of birds/mammals collected. Disturbed 1 pup which ran off ≈ 30 yds & barked at me while I collected scats. Observed Gt Horned owl due at & try to foot an adult S. fox 7-17-89. Riparian area ≈ 1 mile to 3/4 miles east/SE east of den. 2 adults & 2-3 pups in this family group
This area is full of many new & old dens both single & multi-openings & probably has been occupied for a long time.

J C Shaw
Observer

Site Data

SWIFT FOX

Den Site Data

Den No. 09-89

Date 7-25-89

Time 2400hrs

Natal: Yes ____ No ____ ? ✓

No. of Pups 2

No. of Openings 1

Exposure ~~N~~ South-southeast

Slope ≈ 5%

Dates in Use:

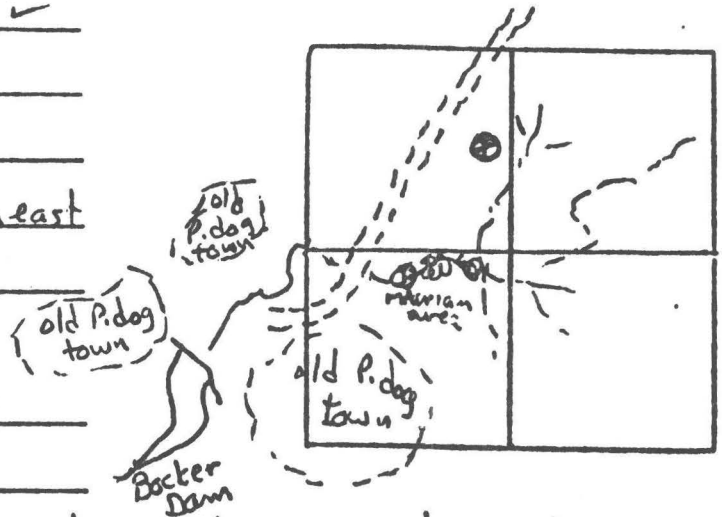
Sign First Seen 7-25-89

Date Abandoned In use

Location:

County Fall River

Twp 8S Rge 9E Sec 17 NW 1/4



Topography: flat to gently rolling hills, moderate ravines

Vegetation: mixed grass, cactus, remnant riparian to south

Activity: Pups 1/3 to 1/2 grown

Food Remains: scats, meadowlark feathers, misc small mammal bones.

Notes: From mid July until the pups disperse in September, they will frequently change den locations due to buildups of ectoparasites, food availability, & predation pressure. Only two pups in this den with only one opening leads me to believe that there are more pups (2-3) in another den location. This is the situation in Den #08-89.

J C Sharp

Observer